Report on the

Stock Assessment Review (STAR) Mop-up Meeting (SSC Groundfish Subcommittee) 2011

Prepared for:
The Center for Independent Experts

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EXECUTIVE SUMMARY

The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.

The Stock Assessment Review (STAR) Mop-up (SSC Groundfish Subcommittee) meeting was held at the AFSC, Seattle, from 26th to 30th September 2011. The meeting reviewed a referred full assessment for widow rockfish (*Sebastes entomelas*), update assessments for bocaccio rockfish (*Sebastes paucispinis*) and darkblotched rockfish (*Sebastes cramer*), and rebuilding analyses for six stocks. This report considers only the stock assessments, not the rebuilding analyses. In addition, the meeting considered aspects of the general STAR terms of reference.

The widow rockfish assessment was referred to the mop-up meeting following concern at STAR 3 that it was insufficiently explored and data were unavailable for that purpose. Specific issues identified for exploration related to model structure. The SSC specified requests to the STAT for completion prior to the mop-up. The STAT responded to all requests as well as to extensive additional requests during the mop-up. Models were thoroughly explored, including close attention to diagnostics and fits, leading to development of an agreed base case assessment. There is little or no information in data to allow estimation of steepness which is identified as the major axis of uncertainty.

Two update assessments were brought to the mop-up meeting for different reasons. The bocaccio rockfish update assessment was brought to the mop-up meeting due to SSC concerns about the use of a new dataset (and work beyond the criteria for update assessments) in the STAT-recommended update. The new dataset was used because the simple update resulted in a very high 2010 yearclass estimate driven by the NWFSC survey but based effectively on one tow. The SSC specified requests to the STAT for completion prior to the mop-up. The STAT responded to all requests and the mop-up agreed with minor modifications to the STAT-recommended update, including the use of the new dataset as an alternative index of yearclass strength. The darkblotched rockfish update assessment was brought to mop-up because the simple update resulted in estimated 2009 depletion greatly reduced from the estimate in 2009 and far more than would be expected from a simple data update. The SSC specified requests to the STAT for completion prior to the mop-up. The STAT responded to all requests. At the mop-up meeting, understanding of the reasons for the changed depletion estimate was progressed, with steepness estimation affected by a complex interplay of new data and model structure. The agreed way forward was to use a revised steepness value based on meta-analysis. The agreed update assessment estimate of depletion in 2009 is now similar to that made in 2009.

Discussions were held on the STAR process terms of reference (ToR), especially related to rebuilding analyses and to update analyses. A list of ToR-related matters for SSC consideration was compiled.

BACKGROUND

General Terms of Reference (ToR) for the STAR process, including for aspects of the meeting (e.g. on "update" assessments), are given in document *2_GF_Stock-Assessment_ToR_2011-12.pdf* available on the ftp server (see appendix 1). Those ToR allow for a "mop-up" meeting and provide guidance on circumstances under which STAR Panels might refer assessments to be considered at the mop-up meeting. The decision on which assessments might be taken to mop-up rests with the SSC.

In 2011, the STAR 3 Panel could not conclude that the proposed pre-STAR base model for widow rockfish (*Sebastes entomelas*) was the best assessment model to be used for management and due to data availability limitations was not able, with the STAT, satisfactorily to explore alternatives. Following STAR 3 comments, the SSC Groundfish Subcommittee recommended that widow rockfish be reconsidered at the mop-up and additionally specified a large number of analyses that should be undertaken in advance.

STAR Panels consider stock assessments subject to "full" re-analysis. In addition, each assessment cycle, STAT undertakes "update" assessments which are not subject to STAR Panel review. Update assessments are reviewed by the SSC directly. At a meeting in May, 2011, two update assessments (for bocaccio rockfish (*Sebastes paucispinis*) and darkblotched rockfish (*Sebastes crameri*) were also referred to the mop-up meeting. Bocaccio rockfish was referred as the STAT recommended changes beyond the scope of an update assessment as outlined in the ToR. Specifically, due to uncertainty over a large incoming yearclass, the STAT recommended use of a new recruitment index. The SSC specified a number of analyses to be undertaken prior to the mop-up. Darkblotched rockfish was referred because the status in 2009, as assessed in 2011, was considerably lower than previously assessed and much greater than would be expected for an update assessment. The assessment was referred, together with specified analyses, to ensure a better understanding of the factors influencing the assessment.

In addition to referred full and update assessments, the mop-up meeting also considered rebuilding analyses for six stocks, including updated analyses for bocaccio rockfish and darkblotched rockfish following from the revised update assessments. The ToR for rebuilding analyses are included in the general STAR process ToR.

The ToR for the STAR process are extensive and comprehensive. The ToR cover not just procedural matters, responsibilities, etc, but also provide guidance and criteria for various issues. The mop-up meeting is a natural place to consider the ToR and to provide feedback on the process and specific issues. The 2011 mop-up provided good opportunity for such discussion, covering in particular definitions of update assessments and the utility of rebuilding analyses.

REVIEW PROCESS

ToR 7 *Provide a brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations*

The Stock Assessment Review (STAR) Mop-up (SSC Groundfish Subcommittee) was held at the AFSC, Seattle, from 26th to 30th September 2011.

Participants in the meeting are listed in Appendix 3. The meeting comprised a PFMC SSC-appointed Chair (Gertseva), various SSC-appointed reviewers and one CIE reviewer (Stokes), as well as Council staff, GAP and GMT representatives in an advisory role. Various STAT members participated to present and discuss relevant assessments and rebuilding analyses. Rapporteurs were appointed in advance and during the opening session. Other participants included NWFSC staff. There was limited public and industry participation. All participants were able to participate throughout the meeting and opportunity was given for input. Notification of the meeting and dissemination of papers followed closely the schedule laid out in the CIE Statement of Work (see Appendix 2). Materials were provided in advance *via* a dedicated ftp server (see Appendix 1). Administration of the meeting was sound and meeting facilities good.

General Terms of Reference (ToR) for the STAR process, including for aspects of the meeting (e.g. on "update" assessments), are given in document *2_GF_Stock-Assessment_ToR_2011-12.pdf* available on the ftp server (see appendix 1). Terms of reference for the CIE reviewer are given in Appendix 2, Annex 2.The meeting covered consideration of stock assessment for widow rockfish (*Sebastes entomelas*), referred to the mop-up meeting due to incomplete exploration for and during STAR 3; update assessments for bocaccio rockfish (*Sebastes paucispinis*) and darkblotched rockfish (*Sebastes crameri*), referred to the mop-up meeting by the SSC; and a range of rebuilding analyses for groundfish, following an agreed schedule. The meeting process was very good. Presentations by STAT were generally well prepared, thoughtful, and of appropriate detail to allow thorough discussion and exploration. All assessments and rebuilding analyses were considered thoroughly with multiple requests made of STAT and the meeting moving back and forward amongst topics as responses were prepared. The meeting was well able to consider all issues in the time available.

In addition to consideration of stock assessments and rebuilding analyses, the meeting also discussed relevant issues of management context and how science is best able to support management needs. Specific discussion was held on possible amendment of ToR for rebuilding analyses and update assessments, as well as on the STAR process. With respect to the STAR process, and reflecting comments by CIE reviewers during STAR 2-5, consideration of separate data issues was suggested. Specific issues identified during the 2011 STAR Panels include statistical analysis of survey indices, historical catch revisions, and historical discard estimates. For rebuilding analyses and update assessments, a range of possible ToR amendments were

identified and discussed; a thorough and hopefully useful list for SSC consideration was developed during the final mop-up meeting session and immediately afterwards by e-mail.

REVIEWER'S ROLE IN THE REVIEW ACTIVITIES

The role of the reviewer is set out in the CIE Statement of Work, Attachment A, attached here in Appendix 2, Attachment A. The CIE reviewer is tasked with producing an independent report to the CIE. The reviewer is additionally tasked (ToR 6) with contributing to the meeting summary report.

In addition to *becom(ing) familiar with the draft stock assessments(s) and background materials* (ToR 1), I (Stokes) participated in all discussions and contributed to note-taking on all issues (review of new widow rockfish stock assessment, review of updated assessments for bocaccio and darkblotched rockfish), review of rebuilding analyses (all stocks), consideration of terms of review for rebuilding analyses and stock assessment updates). Notes were provided to the chair on request, as was draft text on two rebuilding analyses (petrale sole and canary rockfish). The chair undertook to produce the main report, drawing on notes and contributions from all participants; the draft was produced in good time and ample opportunity for comment was given. I made a small contribution by e-mail, reflecting the high quality of the draft and agreement with comments made quickly by one other participant.

Note that whilst the CIE reviewer participated in all discussions (stock assessments, rebuilding analyses, terms of reference) and contributed to the wider report (e.g., on rebuilding analyses), the CIE report, by agreement, only covers stock assessment-related activities under ToR 2-5. The report does not include consideration of rebuilding analyses.

SUMMARY OF FINDINGS (BY STOCK)

ToR 2 *Evaluate model fits, performance, and results of SSC's requests for widow rockfish, darkblotched rockfish, and bocaccio assessments.*

Widow rockfish

Following STAR 3 comments, the SSC Groundfish Subcommittee recommended that widow rockfish be reconsidered at the mop-up and specified a large number of analyses that should be undertaken in advance (see *4a.Widow_rockfish_SSC_Requested_Analysis_for_MopUp_ver3.pdf* on ftp server). The STAT provided responses to all SSC requests for consideration at the mop-up meeting. In addition, during the mop-up meeting, a number of additional requests were made to explore in greater depth model behavior and fits. The STAT responded comprehensively to all

additional requests such that the STAT and SSC Subcommittee, together with advisors, were able to define a current base case assessment and decision table.

The initial analyses in response to SSC requests helped to identify a useful foundation for the base case assessment. Following STAR 3 comments and indications, the new base case has been simplified to include a single area and all available length composition data to allow estimation of growth and size-based selectivities. The pre-STAR assessment included two areas and very little length composition data; growth for each area was fixed and selectivities were all age-based and domed. The availability of new data and further exploration has led, reasonably, to the use of a single area model, growth being estimated, and selectivities being size-based and with a mixture of domed and asymptotic selectivity.

Extensive additional analyses undertaken during the mop-up meeting helped to identify further refinements. Exploration was focused on detailed examination of likelihoods under various model configurations, and careful examination of diagnostics (both from the post-STAR assessment, brought to the mop-up meeting) and of requested assessments. Examination of post-STAR fits to length frequencies (see *4_Widow_rockfish_Assessment_Post-STAR_To_Mopup_He et al_2011.pdf*, Appendix F, on ftp server) and then of likelihood components on exploratory fits, strongly suggested that selectivity for commercial fleets should be blocked from 2003. When offered freedom to be domed, there was a clear preference for domed selectivity on most fleets prior to 2002 (with the exception of the ASP fishery), and asymptotic (or near asymptotic) behavior from 2003. Discussions on the reasons for the difference were inconclusive but the meeting agreed that the blocking should be maintained and recognized the correspondence to management measures implemented at that time. Fits with freed-up selectivity and blocked to 2002 and 2003 onwards were accepted as a base case. The general model structure is now credible. It is suggested that further exploration of the fleet structures used in the assessment would be valuable for the next benchmark assessment and that consideration of the reasons for selectivity changes/patterns would help to build confidence in the assessment.

Examination of post-STAR model fits suggested there was little or no information on steepness (the difference in likelihood in fitting phases was very small, of the order of 0.3 when estimating steepness after natural mortality). In the reformulated assessment with selectivity blocking, profiling on steepness similarly suggested very small differences in likelihood (a few units in absolute terms, tiny in relative terms) across a broad range (0.25 to 0.95). It was agreed that for the base case assessment, the value of 0.76 for steepness from the meta-analysis of rockfish productivity by Dorn should be used and that natural mortality should be estimated using the priors developed by Hamel and used extensively for rockfish in 2011. The male and female estimates of natural mortality were close to the prior medians. Model tuning using the fixed steepness, estimating natural mortality and re-weighting using standard procedures was undertaken.

Overall, the agreed base case is credible. The structure is simple, data have been made available to allow growth estimation, diagnostics have been carefully examined, and the assumptions relating to steepness, natural mortality, selectivity, etc, have been sufficiently justified. Fitting procedures have been well implemented and the base case represents a significant technical improvement compared to the pre-STAR model. The STAT has undertaken substantial work to improve the assessment and should be commended for stamina and patience.

Darkblotched rockfish

The darkblotched rockfish "update" assessment illustrates the difficulty inherent with simple updating of complex statistical models fitting multiple parameters, especially when the (potentially) most informative data on key parameters are relatively recent and datasets are short.

The SSC requested a number of analyses to test why the 2011 update gives very different results to the 2009 update (itself based on a 2007 full assessment). The STAT response was thorough and identified the key source of change as related to treatment of the survey data. Analysis of survey spatial patterns also suggested that sampling of darkblotched rockfish may not be highly effective. Further exploration during the mop-up meeting attempted to distinguish clearly how different datasets contributed to the different results. It is clear from analyses undertaken that the most important data contributing to the changed update result are the length compositions from the NWFSC slope survey. Data alone, however, are not an explanation. Rather, explanations need to be sought that include the interplay between data, the set of assumptions (e.g. on selectivity), and the flexibility of the complex model to interpret data differently, especially with respect to key parameters (notably steepness) for which there is little actual information to allow robust estimation. The primary change in the 2011 update assessment (post mop-up) is the use of the updated general rockfish prior for steepness (due to Dorn), setting a median value of 0.76 as opposed to the value of 0.60 estimated in 2007 and re-used 2009. In the 2007 assessment and the 2009 update, the model estimate of steepness was used in the base case. In the 2011 update it is clear that the model now wants to interpret available data to suggest a much higher steepness. Use of a higher steepness value is reasonable and, overall, the work on darkblotched rockfish has led to a credible current interpretation of data and stock characterization. The model fits are acceptable.

Bocaccio rockfish

As for darkblotched rockfish, the bocaccio rockfish "update" illustrates difficulties with simple handle turning on assessments. Not so much in this case because of the intricacies of fitting complex statistical models (to low information data), but rather to dealing with the unexpected. The simple, actual update is problematic insofar as the estimate of the 2010 yearclass is very

large, of a similar magnitude to that observed in the early 1960s. Because the only information on the 2010 yearclass is from very limited NWFSC combo data, with near 90% of the sampled fish from a single tow, the STAT and SSC were uncomfortable accepting the result as a basis for robust status determination and characterizing rebuilding. In presenting the update to the SSC in June 2011, the STAT proposed the use of an alternative index of recruitment, based on a long (from 1970 onwards) power plant impingement index. There were no doubts raised as to model fit *per se*, just to the yearclass determination and effect.

The SSC requested a number of analyses to explore the update assessment and in particular to examine possible alternative recruitment indices. The STAT response was thorough and led to a change in the update assessment whereby the NWFSC selectivity is decoupled for young-of-year fish. The important change compared to the 2009 assessment, however, is the maintenance of the STAT-proposed inclusion of the power plant impingement index. The mop-up meeting reviewed the impingement index, derived from five electricity generating power stations in southern California. The data from fish identified during heat treatments used to clear biofouling are used to create a juvenile index. The correlation between the index and assessment-derived estimates of numbers (linear in log-log space) is good, explaining 58% of the variance. Use of the index suggests a strong 2010 yearclass but much less so than the NWFSC combo survey index. There is no right or wrong way to assess the strength of the 2010 yearclass; only time will reveal its true strength as older fish are seen on fishing grounds. Because of the selectivity patterns there is no prospect of detecting the yearclass in the commercial fishery in 2012, although it should be possible to get an early indication of the yearclass strength from 2011 recreational fisheries (e.g. from length data).

The mop-up meeting did not review model fit diagnostics but concentrated on the impingement index, the indicated time-series of recruitment relative to using the NWFSC combo index, and consideration of appropriate states of nature for decision tables and rebuilding analyses if the impingement index were to be used. It is not possible, therefore, to comment on model fits for the bocaccio rockfish update assessment using the impingement index and as currently configured.

In terms of results, the update seems reasonable (though is more than a simple update, including an alternative dataset). The indicated depletion estimate is greater than but not dissimilar to the 2009 estimate.

ToR 3 *Evaluate model assumptions, estimates, and major sources of uncertainty and provide constructive suggestions for improvements if technical deficiencies or additional major sources of uncertainty are identified.*

Widow rockfish

The widow rockfish assessment now follows fairly standard structural and parameter assumptions. The assessment assumes a single area, selectivity is estimated freely and the patterns for fisheries and surveys are credible (although, as noted at ToR 2, it is **suggested** that further exploration of the fleet structures used in the assessment would be valuable for the next benchmark assessment and that consideration of the reasons for selectivity changes/patterns would help to build confidence in the assessment). There is little or no information to allow credible estimation of steepness and the use of the median from the meta-analysis of productivity (by Dorn) is appropriate, as is use of the prior on natural mortality by Hamel. Estimates of natural mortality and growth are reasonable. Overall, the model assumptions and estimates are not a good basis for management decision-making.

As ever, there is uncertainty from a number of sources, including catch streams and discard estimates, as well as ageing. Further requests during the mop-up meeting related to ageing methods and the reliability of discard data used. Following responses, the consensus was that the issues raised do not create sufficient problems to undermine the assessment or lead to any requirement for sensitivity testing at this time. However, as noted during other STAR reports, there is a general need to complete and review work catch streams and discards and it is **recommended** that this work take place as a separate process (see also ToR 5, below). With regard to ageing, there is clearly a need to better understand errors associated with ageing from multiple sources (state and federal, different readers at different times, etc.) and it is **suggested** that re-reading of samples could be useful to characterize ageing error from different sources. Whether such work should be a priority, however, is moot.

The clear, over-riding area of uncertainty is the value of steepness. Steepness cannot be estimated and the use of the median from the prior for rockfish is appropriate. Definitions of states of nature would naturally flow from use of that prior with low and high states based on the distribution (0.54 and 0.95, as used in other decision tables during 2011; e.g. darkblotched rockfish). The mop-up meeting, however, was concerned that recognition should be made of the lower steepness value previously estimated for widow rockfish (0.41) and therefore specified steepness values for low and high states of nature of 0.41 and 0.90. Given the estimate of 0.41 derives from an assessment that is superseded, and given that recent analyses suggest there is no information credibly to estimate steepness for widow rockfish even when more composition data are available, this does not seem to be entirely logical.

Darkblotched rockfish

The revised update assessment is similar to the previous update but in addition to assuming a higher fixed steepness also, following exploration, frees up selectivity on the NWFSC survey. Freeing up selectivity in this way allows the model extra freedom to interpret/fit composition and index data. The biggest source of uncertainty in the model, and influence on status estimation, is steepness. Depletion estimates are strongly dependent on steepness values used and there is little information in the data actually to estimate the parameter. The 2007 assessment estimated steepness at 0.60, using length composition and very limited conditional-age-at-length data. The addition of two years of composition and conditional age-at-length data lead the model to estimate steepness near to the upper bound. As for many assessments in the region, given data availability, it is dubious whether steepness can be reasonably estimated. Given this, use of a meta-analytically derived prior to determine a fixed parameter value seems reasonable. The prior itself, however, is built up incrementally from steepness values estimated in stock assessments; with increasing use of the prior across assessments, especially to fix steepness, available "data" for use in future meta-analysis may become scarce.

Given the sensitivity of depletion estimates to steepness, and explorations made during the update and mop-up process, it is natural to use steepness as the major axis of uncertainty in decision table and rebuilding analyses and to draw upper and lower values from the meta-analysis posterior.

Bocaccio rockfish

Major source of uncertainty in the bocaccio rockfish assessment were not examined fully during the mop-up. As for all west coast Pacific rockfish assessments it is likely that the major source of uncertainty in current status estimation is steepness or natural mortality, or perhaps catch streams. These were not considered at mop-up. The major uncertainty of relevance identified by the STAT, and during mop-up, and carried forward in the recommended assessment, is that associated with the 2010 yearclass. The uncertainty can be related to the indices used (NWFSC *versus* impingement index) and to the weight given overall to the index used. Use of the NWFSC-derived or impingement-derived indices make little difference to current depletion estimation but would impact greatly on rebuild. For reasons outlined in ToR 3, the STAT and SSC Subcommittee chose to use the impingement-derived index. As a way of portraying uncertainty in the decision table (and in rebuilding analyses), states of nature were defined by giving higher or lower weight to the impingement index in the assessment. The states of nature do not fully line up with the STAR ToR (giving 2:50:25 probability to the low:base:high states) but are conceptually similar.

The SSC Subcommittee decisions have led to an "update" that goes beyond the STAR ToR for update assessments but which is reasonable given the difficulties faced. The estimated depletion

is not affected by the decisions made but the estimates of rebuild will be. By defining states of nature in terms of the recruitment index weighting, the decision tables and rebuilding analyses provided should be useful to the decision-making process. Information from recreational fisheries or from the next survey could suggest appropriate use of the recommended low, base or high states of nature as a basis for decisions. If those new data sources strongly support the high index estimated by the NWFSC it might also be reasonable to revisit the update (if process allows)

ToR 4 *Determine whether the science reviewed is considered to be the best scientific information available.*

Widow rockfish, Darkblotched rockfish, Bocaccio rockfish

In my opinion, the various STAT initially, and in conjunction with the SSC Subcommittee and advisors, has comprehensively reviewed the available information on widow rockfish, darkblotched rockfish, and bocaccio rockfish and has conducted thorough analyses to provide estimates of management-related quantities. Uncertainties in inputs and estimates of interest have been adequately explored and overall I am confident that the resulting assessments and decision tables represent the best scientific information currently available.

ToR 5 *Provide specific suggestions for future improvement in any relevant aspects of data collection and treatment, modeling approaches and technical issues.*

Specific recommendations and suggestions are highlighted in **bold** in the preceding sections. I distinguish between recommendations as necessary activities and suggestions as desirable ones, recognizing that research planning and prioritization requires consideration of multiple factors and applies to many stocks, fisheries and other factors.

I have no specific suggestions or recommendations for the assessments considered by the SSC Subcommitte (mop-up). The update assessments for bocaccio rockfish and darkblotched rockfish raised numerous process issues and led to discussion on STAR ToR. An update is defined as "*an assessment that has included the most recent catch, abundance index, biological and/or environmental data to provide updated status determinations or quota recommendations. It must carry forward its fundamental structure from a model that was previously reviewed and endorsed by a STAR panel."* Detailed guidance is already extensive, specifying that a stock assessment update is appropriate in situations where "*no substantial change has occurred in: a) the particular sources of data used, b) the analytical methods used to summarize data prior to input to the model, c) the software used in programming the assessment, d) the assumptions and structure of the population dynamics model underlying the stock assessment, e) the statistical framework for fitting the model to the data and determining goodness of fit, f) the procedure for weighting of the various data components, and g) the analytical treatment of model outputs in*

determining management reference points, including FMSY, BMSY, and B0. Extending CPUE time series based on fitted models (i.e., GLM models) will require refitting the model and updating all values in the time series. Assessments using updated CPUE time series qualify as updates if the CPUE standardization models follow applicable criteria for assessment models described above. In practice there will always be valid reasons for altering a model, as defined in this broad context, although, in the interests of stability, such changes should be resisted as much as possible. Instead, significant alterations should be addressed in the next subsequent benchmark assessment and review."

The 2011 updates considered by the SSC Subcommittee included, though were not discussed in any detail, changing error assumptions in GLIM analysis for survey indices; using current software (SS3) version rather than that used for the benchmark/full assessment; change of model structure (selectivity assumptions); change in parameter assumptions; and use of revised catch histories/discard information. It is **suggested** that the SSC should consider clarification and possible revision of the relevant ToR.

It is further **suggested** that for updates as well as benchmark assessments, analyses to bridge old and new assessments be undertaken as a matter of course to identify how all assumptions and data, including technical software specifications, affect assessment outputs used as a basis for decision-making. This suggestion is in line with suggestions made throughout the 2011 STAR process.

In line with previous 2011 STAR process reports, it is noted for all stock assessments that a more efficient approach could be used to deal with cross-cutting issues. During 2011, examples of issues pertinent to many assessments include the use of historical catch reconstructions and discard estimates, and the fitting and use of GLM analyses for surveys. Other issues of general importance possibly include the potential for use of commercial CPUE indices (and related GLM approaches), and the systematic testing of standardized software platforms.

CONCLUSIONS AND RECOMMENDATIONS

Because of the wide scope (one full assessment, two updates and multiple rebuilding analyses), it is likely that misinterpretation of some materials, presentations or discussions has been made. This is the fault of the reviewer, not of the many excellent STAT Team scientists who gave good presentations and made the mop-up meeting an enjoyable and educational experience – to them, the SSC Subcommittee and advisors, many thanks. As stated previously in STAR reports during 2011, the NWFSC is in the enviable position of having many excellent scientists doing good work and providing sterling support to the PFMC. This was evident at the mop-up meeting.

The STAR system is well-established and has clear strengths. The use of the mop-up to revisit benchmark and update assessments during the regular process is one of those strengths. The meeting was thorough and well-ordered and, in my view, made sensible, practical decisions aimed always at supporting decision-making in the PFMC system. Participants were keenly aware of, and took seriously, their roles and responsibilities within the overall process.

There are some issues to be attended to in terms of the ToR for the STAR process. These were well discussed during the mop-up and it is **recommended** that the SSC consider the identified issues related to rebuilding analyses and communication, update assessments, and general data processes.

In terms of the specific assessments, the reason for my (as CIE "constant" reviewer during 2011) participation in the mop-up was the conclusion of the STAR 3 Panel that the widow rockfish assessment required further exploration and that data to do that well were not available during the STAR 3 meeting. I was sufficiently concerned after STAR 3 that in my report to the CIE I recommended that the assessment not be taken to mop-up but should rather be re-considered over a longer time period. That recommendation now looks somewhat hasty. The SSC specified a number of requests to the widow rockfish STAT and the STAT responded well and in a timely fashion, creating a good foundation for work during the mop-up. In my opinion, the explorations during the mop-up were thorough and useful and the agreed base case now constitutes a credible basis for decision-making. Given the difficulties during STAR 3, achieving a credible, agreed base case is testament to the professionalism and commitment of the STAT and the SSC and to the robustness of the STAR process.

Specific recommendations and suggestions are highlighted in **bold** in the preceding sections. I distinguish between recommendations as necessary activities and suggestions as desirable ones, recognizing that research planning and prioritization requires consideration of multiple factors and applies to many stocks, fisheries and other factors.

APPENDIX 1

BIBLIOGRAPHY

Prior to the Workshop, extensive materials were provided *via* a dedicated, anonymous ftp server (ftp.pcouncil.org/pub/ GF_STAR_Mop-Up_Rebuilding_2011). The materials were extensive and relevant to all terms of reference in varying degrees.

During the workshop multiple presentations were given, and additional materials were provided on request, including further background documents and presentations as well as responses to Panel requests. All files were made available using the dedicated server which was accessed using hotel guest Wi-Fi throughout the meeting. The access was generally good. Directory listings are not provided here as the server is anonymous (and therefore publicly available).

APPENDIX 2

Attachment A: Statement of Work for Dr. Kevin Stokes

External Independent Peer Review by the Center for Independent Experts

STAR Mop-Up Panel for Pacific Coast Groundfish Stock Assessments

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from www.ciereviews.org.

Project Description: The mop-up panel is designed to provide a second forum for reviewing stock assessments reviewed during earlier 2011 STAR panels and SSC groundfish subcommittee meetings but were deemed to be inadequate and/or required additional analyses and review which could not be completed during the panel meeting. This panel meeting provides the last opportunity to review and accept benchmark or updated stock assessments to inform management specifications and measures. The technical review will take place during a formal, public, multiple-day meeting of fishery stock assessment experts. Participation of an external, independent reviewer is an essential part of the review process. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3**.

Requirements for CIE Reviewer: One CIE reviewer shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. We specifically request the participation of the reviewer who attended all previous 2011 STAR panels (other than Pacific hake). The CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein. CIE reviewer shall have the expertise, background, and experience to complete an independent peer review in accordance with the SoW and ToRs herein. CIE reviewer shall have expertise in fish population dynamics, with experience in the integrated analysis modeling approach, using age-and size-structured models, use of MCMC to develop confidence intervals, and use of Generalized Linear Models in stock assessment models.

Location of Peer Review: The CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled in Seattle, Washington during 26-30 September 2011.

Statement of Tasks: The CIE reviewer shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering committee, the CIE shall provide the CIE reviewer information (name, affiliation, and contact details) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewer. The NMFS Project Contact is

responsible for providing the CIE reviewer with the background documents, reports, foreign national security clearance, and information concerning other pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When the CIE reviewer participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for the CIE reviewer who is a non-US citizens. For this reason, the CIE reviewer shall provide requested information (e.g., name, contact information, birth date, passport number, travel dates, and country of origin) to the NMFS Project Clearance for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations (available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/sponsor.html).

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send by electronic mail or make available at an FTP site the CIE reviewer all necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE on where to send documents. The CIE reviewer shall read all documents in preparation for the peer review.

Panel Review Meeting: The CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs. **Modifications to the SoW and ToRs can not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** The CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified in the contract SoW. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings). The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Contract Deliverables - Independent CIE Peer Review Report: The CIE reviewer shall complete an independent peer review report in accordance with the SoW. The CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. The CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2.

Specific Tasks for CIE Reviewer: The following chronological list of tasks shall be completed by the CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and report provided by the NMFS Project Contact in advance of the peer review;
2) Participate during the panel review meeting in Seattle, Washington during 26-30 September 2011 as called for in the SoW, and conduct an independent peer review in accordance with the ToRs (Annex 2);
3) No later than 15 October 2011, the CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and CIE Regional Coordinator, Dr. David Die, via email to ddie@rsmas.miami.edu. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in Annex 2;
4) The CIE reviewer shall address changes as required by the CIE review in accordance with the schedule of milestones and deliverables.

Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

12 September 2011	NMFS Project Contact sends the CIE Reviewer the pre-review documents
26-30 September 2011	The CIE reviewer participates and conducts an independent peer review during the panel review meeting
14 October 2011	The CIE reviewer submit draft CIE independent peer review report to the CIE Lead Coordinator and CIE Regional Coordinator
28 October 2011	CIE submits CIE independent peer review report to the COTR
4 November 2011	The COTR distributes the final CIE report to the NMFS Project Contact and regional Center Director

Modifications to the Statement of Work: Requests to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on substitutions. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review report by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these report shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (the CIE independent peer review report) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards: (1) each CIE report shall have the format and content in accordance with Annex 1, (2) each CIE report shall address each ToR as specified in Annex 2, (3) the CIE report shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

Distribution of Approved Deliverables: Upon notification of acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE report in *.PDF format to the COTR. The COTR will distribute the approved CIE report to the NMFS Project Contact and regional Center Director.

Key Personnel:

William Michaels, Program Manager, COTR
NMFS Office of Science and Technology
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William.Michaels@noaa.gov Phone: 301-713-2363 ext 136

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Northern Taiga Ventures, Inc.
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NMFS Project Contact:

Stacey Miller
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2032 SE OSU Drive, Newport OR 97365
Stacey.Miller@noaa.gov Phone: 206-437-5670

Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR, and Conclusions and Recommendations in accordance with the ToRs.

   a. Reviewer should describe in their own words the review activities completed during the panel review meeting, including providing a detailed summary of findings, conclusions, and recommendations.

   b. Reviewer should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.

   c. Reviewer should elaborate on any points raised in the Summary Report that they feel might require further clarification.

   d. Reviewer shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

   e. The CIE independent report shall be a stand-alone document for others to understand the proceedings and findings of the meeting, regardless of whether or not they read the summary report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include as separate appendices as follows:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work
   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

Annex 2: Tentative Terms of Reference for the Peer Review

STAR Mop-Up Panel for Pacific Coast Groundfish Stock Assessments

1. Become familiar with the draft stock assessment and background materials.
2. Evaluate model fits, performance, and results of SSC's requests for widow rockfish, darkblotched rockfish, and bocaccio assessments.
3. Evaluate model assumptions, estimates, and major sources of uncertainty and provide constructive suggestions for improvements if technical deficiencies or additional major sources of uncertainty are identified.
4. Determine whether the science reviewed is considered to be the best scientific information available.
5. Provide specific suggestions for future improvement in any relevant aspects of data collection and treatment, modeling approaches and technical issues.
6. Assist in the development of a summary report.
7. Provide a brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations

Note – CIE reviewers typically address scientific subjects, hence ToRs usually do not involve CIE reviewers with regulatory and management issues unless this expertise is specifically requested in the SoW.

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Annex 3: Agenda

STAR Mop-Up Panel for Pacific Coast Groundfish Stock Assessments

Seattle, Washington during 26-30 September 2011

Point of contact for reviewer security & check-in

The Agenda will be provided

by the Project Contact no later than 12 Sept 2011

APPENDIX 3

PERTINENT INFORMATION FROM THE REVIEW

Participants List

Reviewers

Vladlena Gertseva	NMFS NW Fisheries Science Center, SSC, Chair
Martin Dorn	NMFS Alaska Fisheries Science Center, SSC
Owen Hamel	NMFS NW Fisheries Science Center, SSC, (also POP STAT)
Theresa Tsou	Washington Department of Fish and Wildlife, SSC
Dave Sampson	Oregon State University, SSC (by teleconference)
Ray Conser	NMFS SW Fisheries Science Center, SSC
Kevin Stokes	Center for Independent Experts
Vidar Wespestad	SSC (part time)

Advisors

Gerry Richter	Point Conception Groundfishermen's Association, GAP
Corey Niles	Washington Department of Fish and Wildlife, GMT
John DeVore	Pacific Fishery Management Council

Stock Assessment Team (STAT) Members (part time)

Xi He	NMFS SW Fisheries Science Center, Widow STAT
John Wallace	NMFS NW Fisheries Science Center, Canary STAT
John Field	NMFS SW Fisheries Science Center, Bocaccio STAT
Andi Stephens	NMFS NW Fisheries Science Center, Darkblotched STAT
Kotaro Ono	University of Washington, POP STAT
Melissa Haltuch	NMFS NW Fisheries Science Center, Petrale STAT
Ian Taylor	NMFS NW Fisheries Science Center, Yelloweye STAT

Others in Attendance

Jim Likes	
Richard Carroll	Ocean Gold Seafoods (part time)
Jim Hastie	NMFS NW Fisheries Science Center (part time)